

In the Abstract

Please amend the abstract to read as follows:

B1 A method for controlling drag and vortex induced vibration in a substantially cylindrical element by providing an ultra-smooth surface about the cylindrical element. The system for controlling drag and vortex induced vibration utilizes a substantially cylindrical marine element having an ultra-smooth effective surface.

In the Specification

Please amend the paragraph beginning on Page 4, line 2, to read as follows:

B2 FIGS. 1 and 2 illustrate a substantially cylindrical sleeve 10 presenting an ultra-smooth surface 12. Here the sleeve is a clam-shell design formed of fiberglass with a gel-coat presenting ultra-smooth surface 12. Opposing sides of the clam-shell are secured with hinges 14 and connectors such as latches 16 which may be secured with a hairpin 18 in one embodiment of the present invention. See also FIG. 3-4. In FIG. 5, a hinge 16 is shown as secured by pin 18 and retaining ring 19. Lifting provisions may be conveniently provided with lifting eyes 22. Ribs 20 provide some strength to the sleeve 10 and may be formed to axially secure the sleeve about riser sections.

Please amend the paragraph beginning at Page 5, line 5 to read as follows:

B3 FIGS 12-13 illustrate another embodiment, here for using half length sleeve sections 10 with full length buoyancy modules 26. In this instance two types of sleeve sections are used, hanging sleeve 10A and stacking sleeve 10B. The hanging sleeve engages to the top surface of the buoyancy module and any centralizer presented there. The stacking sleeve 10B can be configured to engage to the bottom of hanging sleeve 10A or to rest on top of the next lower hanging sleeve 10C and the ribs are configured accordingly. See FIG. 13.

Please amend the paragraph beginning at Page 6, line 5 to read as follows:

B4 If sleeves are used to present the substantially cylindrical ultra-smooth surface, there are a number of alternatives to construct and attach or install the sleeves. For instance, the sleeve can be clam-shelled around the cylindrical element using hinges and alternative latching mechanisms such as snaps, bolts, or other fasteners. Alternatively, the sleeves can be made with a continuous circumference and slid over a cylindrical element. Or there are other alternatives for constructing a sleeve from one or more sections. For instance, the sleeve need not be constructed of halves, each covering an approximately equal amount of the circumference. A C sleeve (a sleeve that covers more than 180 degrees of the circumference but less

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than 360 degrees of the circumference) can be made with the rest of the circumference optionally enclosed by a second piece that completes the circumference. The C shaped sleeve can be clam-shelled around the cylindrical element using hinges and a latching mechanism, or can be slid over the structure. Further, sleeves, or sleeve sections, covering all or part of the circumference, can be held in place using hardware that is attached to the cylindrical element itself. This hardware can include latches, receptacles for bolts, pins, rivets, screws, or other fasteners. Or, a sleeve that consists of two or more parts, which make up the circumference, can be made such that the parts are held together by straps or banding materials. This includes the possibility of providing grooves in the cylindrical element to allow for strapping materials. Further, the sleeves can be pre-installed, they can be installed on the cylindrical element during its installation (e.g. while running a drilling riser); or they can be installed after the cylindrical element has already been installed (a post-installation).

Please amend the paragraph beginning at Page 7, line 4 to read as follows:

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While there are many ways to provide it, a critical aspect is the ultra-smooth surface. The drag coefficient for flow past a cylinder sharply decreases as the Reynolds number is increased beyond about 200,000 (called the "critical" Reynolds number range) and then slowly recovers (called the "supercritical" Reynolds number range). While it was recognized that surface roughness can affect the Reynolds number at which this "dip" occurs and can add to the drag coefficient, conventional wisdom held that cylindrical elements should experience substantial VIV accompanied by fairly large drag at critical and supercritical Reynolds number ranges.

Please amend the paragraph beginning at Page 7, line 13 to read as follows:

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But, surprisingly, it was discovered that a very smooth cylinder would not experience VIV in this Reynolds number range, and furthermore this cylinder would experience very low drag. Further, an "ultra-smooth" sleeve can be effective in Reynolds number ranges from about 200,000 to over 1,500,000, perhaps more. In fact, benefits begin to be seen in the VIV and drag at a Reynolds number of about 100,000.

Please amend the paragraph beginning at Page 7, line 22 to read as follows:

B7
K is the roughness density and is defined as the average peak to trough distance of the surface roughness (e.g., as measured using confocal scanning with an electron microscope); and D is the effective outside diameter of the cylinder element, including any sleeve or coating.